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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/779,839	02/17/2004	Sanjiv Kapil	004-40033	9176
62663 7590 12/27/2006 DARBY & DARBY, P.C. P.O. BOX 5257 NEW YORK, NY 10150-5257			EXAMINER MCLEAN MAYO, KIMBERLY N	
			ART UNIT 2187	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE			MAIL DATE	DELIVERY MODE
3 MONTHS			12/27/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/779,839	Applicant(s) KAPIL, SANJIV	
	Examiner Kimberly N. McLean-Mayo	Art Unit 2187	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-62 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 31-40 is/are allowed.
- 6) ☒ Claim(s) 1-16, 18-21, 23, 25-30 and 40-62 is/are rejected.
- 7) ☒ Claim(s) 17, 22 and 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 2/17/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>9/26/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The enclosed detailed action is in response to the Application submitted on February 17, 2004 and the Information Disclosure Statement submitted on July 29, 2005.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 20 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 11 which claim 20 depends from is a process claim; claim 20 is an attempt to claim an article of manufacture. Clarification is required. If the Applicant is attempting to claim a process, then claim 20 should include steps or acts. If the Applicant is attempting to claim an article of manufacture, then the claim requires a computer readable medium containing instructions to perform a series of steps or acts.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

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subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 1-5, 10, 41-45 and 48-49 are rejected under 35 U.S.C. 102(b) as being anticipated by Wang et al. (USPN: 5,715,428).

Regarding claim 1-2, Wang discloses a processing unit that handles processing of snoop related communications for a plurality of independent cache units of the processing unit based at least in part on whether the snoop related communications are initiated or externally with respect to the processing unit (C 5, L 33-43; C 7, L 23-34, L 58-64).

Regarding claim 3, Wang discloses delaying issuance of an externally initiated snoop to the plurality of independent cache units at least until the plurality of independent cache units is capable of processing the externally initiated snoop (C 7, L 58-64; when an internal snoop request and external snoop request collide, the external snoop requests are delayed since the cache units are not able to service the request because the internal snoop request is being processed).

Regarding claim 4, Wang discloses the plurality of independent cache units capable of processing the externally initiated snoops after completing processing of one or more previously issued snoops (C 7, L 58-64; when an internal snoop request and external snoop request collide, the external snoop requests are serviced after the internal snoop request).

Regarding claim 5, Wang discloses the processing unit issuing internally initiated snoops without stalling (C 7, L 58-64).

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Regarding claim 10, Wang discloses each of the plurality of cache units including one or more of instruction cache, data cache, L2 cache and L3 cache (Figure 1).

Regarding claim 41, Wang discloses a plurality of cache units (C 4, L 49-60); and a snoop controller to determine whether snoops are initiated externally or internally with respect to the plurality of cache units and to issue snoops in accordance with the determination (C 5, L 33-43; C 7, L 23-34, L 58-64).

Regarding claims 42-44, Wang discloses the snoop controller coordinating issuance of an externally initiated snoop to the plurality of cache units, such that the snoop controller delays issuance of an externally initiated snoop at least until the plurality of cache units are capable of processing the externally initiated snoop to ensure cache unit snoop pipelines conform to sequential snoop constraints (C 7, L 57-63).

Regarding claim 45, Wang discloses the snoop controller issuing internally initiated snoops without delay (C 7, L 61-63).

Regarding claims 48-49, Wang discloses a bus arbiter to arbitrate between internal events and bus events (Figure 1, References 14 and 15; C 4, L 17-21).

5. Claims 21, 26, 28 and 53, 55, 57-58 are rejected under 35 U.S.C. 102(e) as being anticipated by Gupta (USPN: 6,604,116).

Regarding claims 21, 28, 53 and 57-58, Gupta discloses determining if a snoop is externally or internally initiated with respect to a domain (Figure 4, References 422, 424); if the snoop is internally initiated issuing the snoop from the internal first cache unit that initiates the snoop to an internal second cache unit, wherein the first and second cache units are of domain and supplying an internal snoop response from the second cache unit to the first cache unit (C 7, L 15-23); and if the snoop is externally initiated, issuing the externally initiated snoop response from the second cache unit to the first cache unit, generating a processing unit response based at

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least in part on responses from the first and second cache units and supplying the processing unit response at least to the source of the externally initiated snoop (C 7, L 24-32).

Regarding claim 55, Gupta discloses a bus arbiter to arbitrate internal events (memory) and bus events (memory), wherein the bus arbiter handles bus events with priority over internal events (Figure 1, Reference 10).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 6-9, 11-16, 19 and 46-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (USPN: 5,715,428) in view of Hoover et al. (USPN: 5,805,837).

Regarding claims 6-9, 11, 15 and 19, Wang discloses the limitations cited above in claim 1, however, Wang does not disclose gathering responses to externally initiated snoops from a plurality of independent cache units and generating a snoop response for the processing unit based at least in part on the gathered independent cache units' snoop responses. However, Hoover discloses gathering responses to snoop request (s) from a plurality of independent cache units and generating a snoop response for the processing unit based at least in part on the gathered independent cache units' snoop responses (C 7, L 37-42). This feature taught by Hoover provides efficiency by reducing wiring/tracing and the number of signals required to

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transfer snoop responses to an external device. Hence, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Hoover's teachings in the system taught by Wang for the desirable purpose of efficiency.

Regarding claims 12 and 14, Wang and Hoover disclose storing snoop address in respective snoop queues (Wang – C 12, L 20-25).

Regarding claim 13, Wang and Hoover disclose delaying issuance of the snoop addresses that correspond to an externally initiated snoop at least until the cache units have completed prior pending snoop processing (Wang - C 7, L 30-35).

Regarding claim 16, Wang and Hoover disclose the snoop responses in accordance with a cache coherency protocol that includes one or more of a MOESI cache coherency protocol, a MESI cache coherency protocol, a MOSI cache coherency protocol and a MSI cache coherency protocol (Wang – C 5, L 61-67; C 6, entire).

Regarding claim 18, Wang discloses supplying an internal snoop response to the initiating cache unit (C 7, L 40-47).

Regarding claims 46-47, Wang discloses the limitations cited above, however, Wang does not explicitly disclose coherently gathering cache responses to an externally initiated snoop and generating a unified snoop response based at least in part in the gathered cache responses.

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However, Hoover teaches the concept of coherently gathering cache responses to an externally initiated snoop and generating a unified snoop response based at least in part in the gathered cache responses (c 7, L 37-42). This feature taught by Hoover provides efficiency by reducing wiring/tracing and the number of signals required to transfer snoop responses to an external device. Hence, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Hoover's teachings in the system taught by Wang for the desirable purpose of efficiency.

Regarding claim 50, Wang does not disclose recording addresses. However, it is well known in the art to store the addresses of cache misses particularly in a pipelined or multiprocessing system to allow merging of multiple request to the same missed address in the cache, which improves the performance of the system. Thus, it would have been obvious to one of ordinary skill in the art to store the addresses of cache misses in the system taught by Wang for the desirable purpose of improved performance.

8. Claims 23, 25 and 61-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta (USPN: 6,604,116) in view of Wang (USPN: 5,715,428).

Regarding claim 23, Gupta discloses the limitations above, however, Gupta does not explicitly disclose the type of cache coherency protocol used in the system. Wang discloses the MESI protocol to maintain cache coherency (C 5, L 18-32). This protocol provides an efficient way to achieve cache coherency. Hence, it would have been obvious to one of ordinary skill in the art to use the MESI protocol in Gupta's system for the desirable purpose of efficiency.

Regarding claims 25 and 61-62, Gupta does not disclose delaying issuance of the externally initiated snoop at least until the first and second cache units have completed processing of one or more prior pending snoops. However, Wang teaches delaying issuance of the externally initiated snoop at least until the first and second cache units have completed processing of one or more prior pending snoops (C 7, L 57-63). This feature taught by Wang reduces collisions and thus improves the performance of the system. Hence, it would have been obvious to one of ordinary skill in the art to use Wang's teachings in the system taught by Gupta for the desirable purpose of improved performance.

9. Claims 56 and 59 are rejected under 35 U.S.C. 102(e) as being anticipated by Gupta (USPN: 6,604,116) in view of Hoover (USPN: 5,805,837).

Gupta discloses the limitations cited above in 53, however, Gupta does not disclose merging cache responses to externally initiated snoops. Hoover, teaches the concept of merging cache responses to externally initiated snoops (C 7, L 37-42). This feature taught by Hoover provides efficiency by reducing wiring/tracing and the number of signals required to transfer snoop responses to an external device. Hence, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Hoover's teachings in the system taught by Gupta for the desirable purpose of efficiency.

10. Claims 27, 54 and 58 are rejected under 35 U.S.C. 102(e) as being anticipated by Gupta (USPN: 6,604,116) in view of Abramson et al. (USPN: 5,751,983).

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Gupta discloses the limitations cited above, however, Gupta does not disclose delaying issuance of the snoop if the snoop address overlaps an address of an internal cache miss of a read or write operation at least until arrival of data for the internal cache miss. However, Abramson teaches the concept of blocking [delaying] snoops to an address, which is pending a cache miss (C 11, L 22-34). This concept improves the performance of the system by preventing the system from wasting time performing a snoop to an address that is already known to not be in the cache since it is to an address which is pending a cache miss. Hence, it would have been obvious to one of ordinary skill in the art to incorporate Abramson's teachings with the teachings of Gupta for the desirable purpose of improved performance.

11. Claims 51 and 52 are rejected under 35 U.S.C. 102(e) as being anticipated by Wang (USPN:5,715,428) in view of Abramson et al. (USPN: 5,751,983).

Wang discloses the limitations cited above, however, Wang does not disclose delaying issuance of the snoop if the snoop address overlaps an address of an internal cache miss of a read or write operation at least until arrival of data for the internal cache miss. However, Abramson teaches the concept of blocking [delaying] snoops to an address, which is pending a cache miss (C 11, L 22-34). This concept improves the performance of the system by preventing the system from wasting time performing a snoop to an address that is already known to not be in the cache since it is to an address which is pending a cache miss. Hence, it would have been obvious to one of ordinary skill in the art to incorporate Abramson's teachings with the teachings of Wang for the desirable purpose of improved performance.

Allowable Subject Matter

12. Claims 31-40 are allowed.
13. Claims 17, 22 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly N. McLean-Mayo whose telephone number is 571-272-4194. The examiner can normally be reached on Mon, Wed, Thurs (10-4), Tues (9:45 - 6:15).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 571-272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

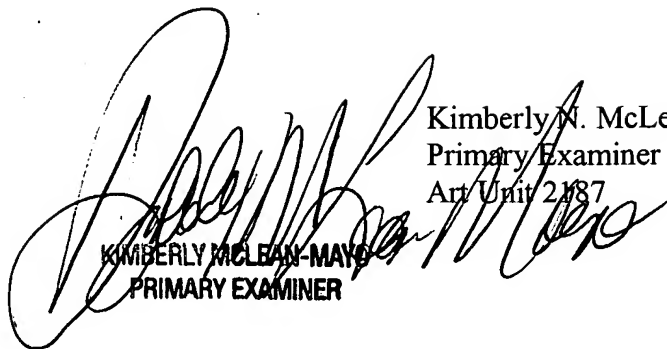
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KNM

September 26, 2006


Kimberly N. McLean-Mayo
Primary Examiner
Art Unit 2187
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